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(54) **INKJET PRINTING SYSTEMS USING FILTER FLUID INTERCONNECTS FOR PIGMENTED INKS**

(75) Inventors: **David R. Otis, Jr.**, Corvallis; **Daniel W. Petersen**, Philomath; **Donald L. Michael**, Monmouth, all of OR (US)

(73) Assignee: **Hewlett-Packard Development Company, L.P.**, Houston, TX (US)

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(52) **U.S. Cl.** **347/23**; 347/85
(58) **Field of Search** 347/28, 85, 86, 347/87, 92, 93; 210/446

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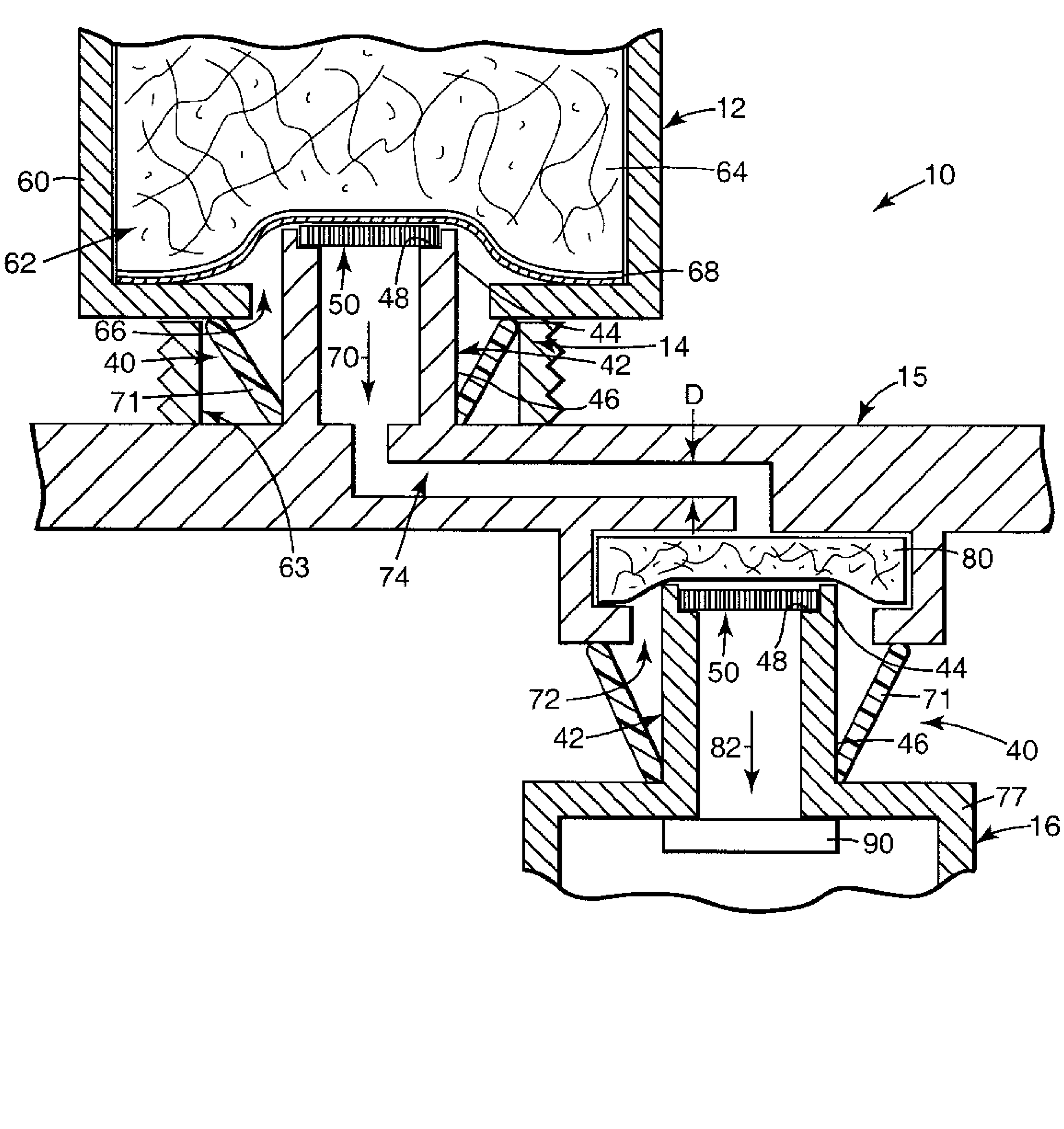
Primary Examiner—Anh T. N. Vo
(74) *Attorney, Agent, or Firm*—Kevin B. Sullivan

(57) **ABSTRACT**

Disclosed is a pigmented fluid delivery system for an inkjet printing system. The pigmented fluid delivery system comprises a first printer component and at least a second printer component. The first printer component has a fluid outlet in fluid communication with a supply of pigmented fluid defined by particles suspended in a carrier fluid. The second printer component has a fluid inlet releasably connectable to the fluid outlet of the first printer component. The fluid inlet includes a filter compatible with the supply of pigmented fluid. The filter is an open weave screen defining a plurality of pores. The pores are sized to allow passage of the pigmented fluid while preventing clogging from flocculation of the particles and evaporation of the carrier fluid.

30 Claims, 5 Drawing Sheets



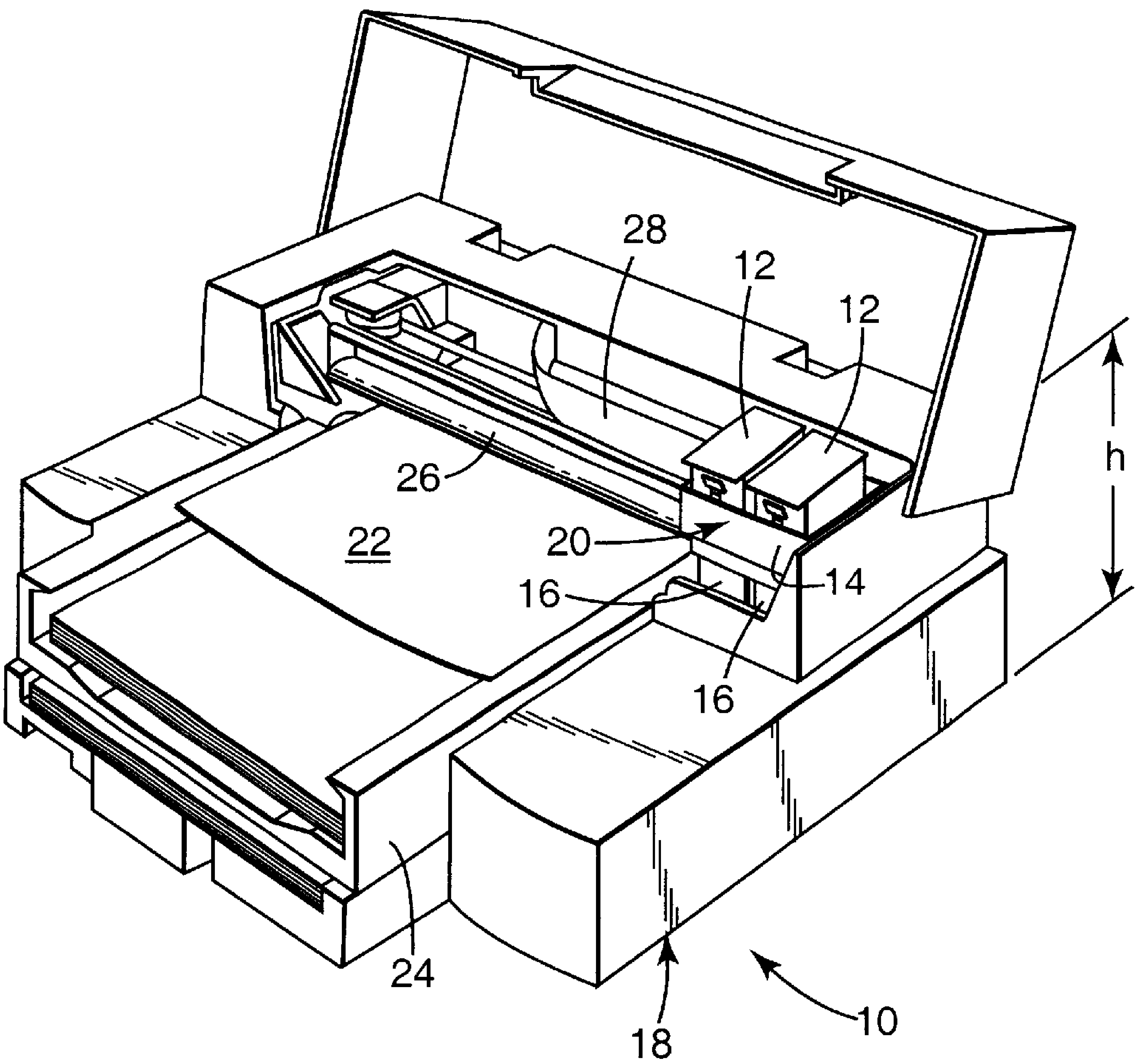


Fig. 1

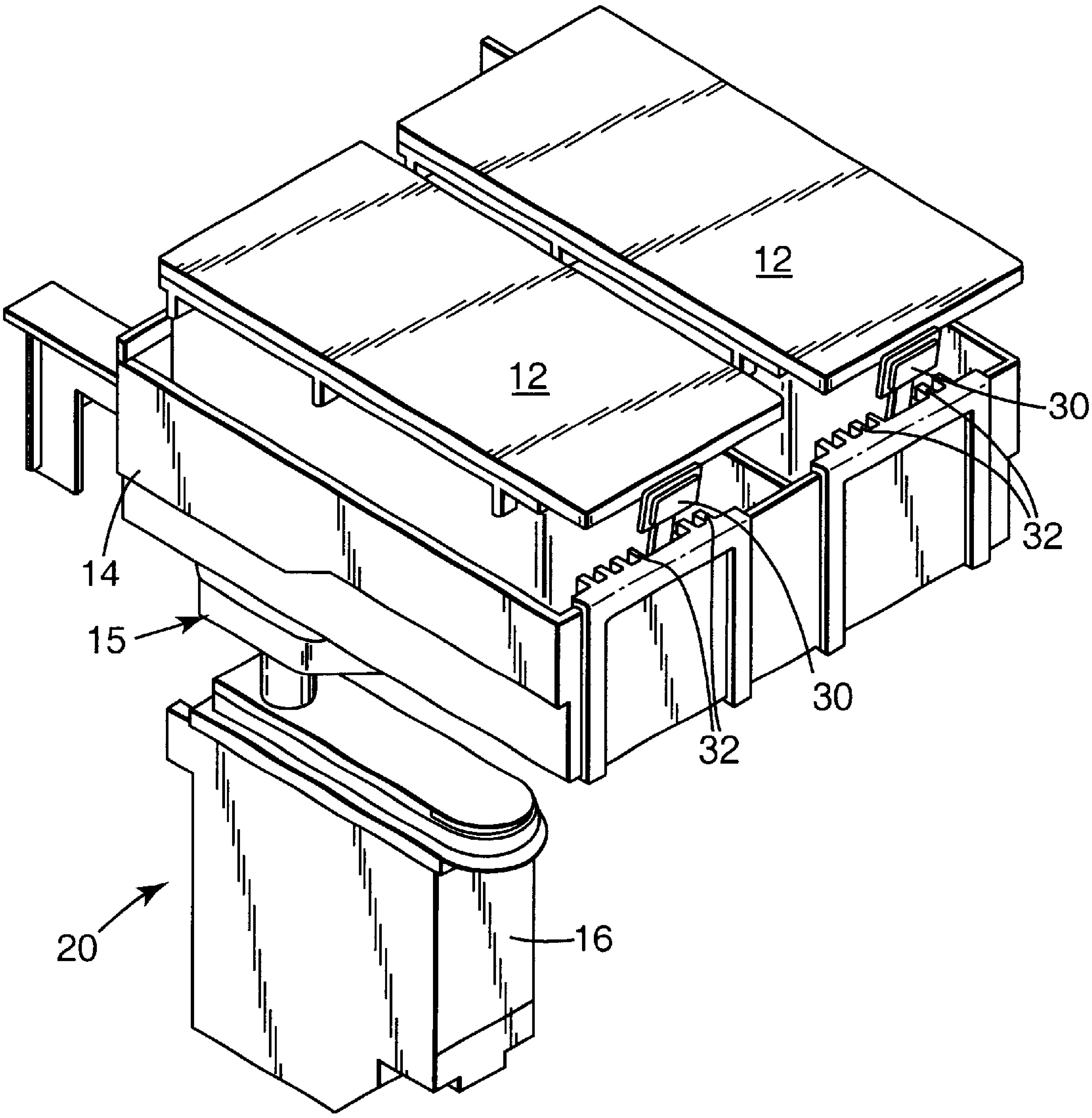


Fig. 2

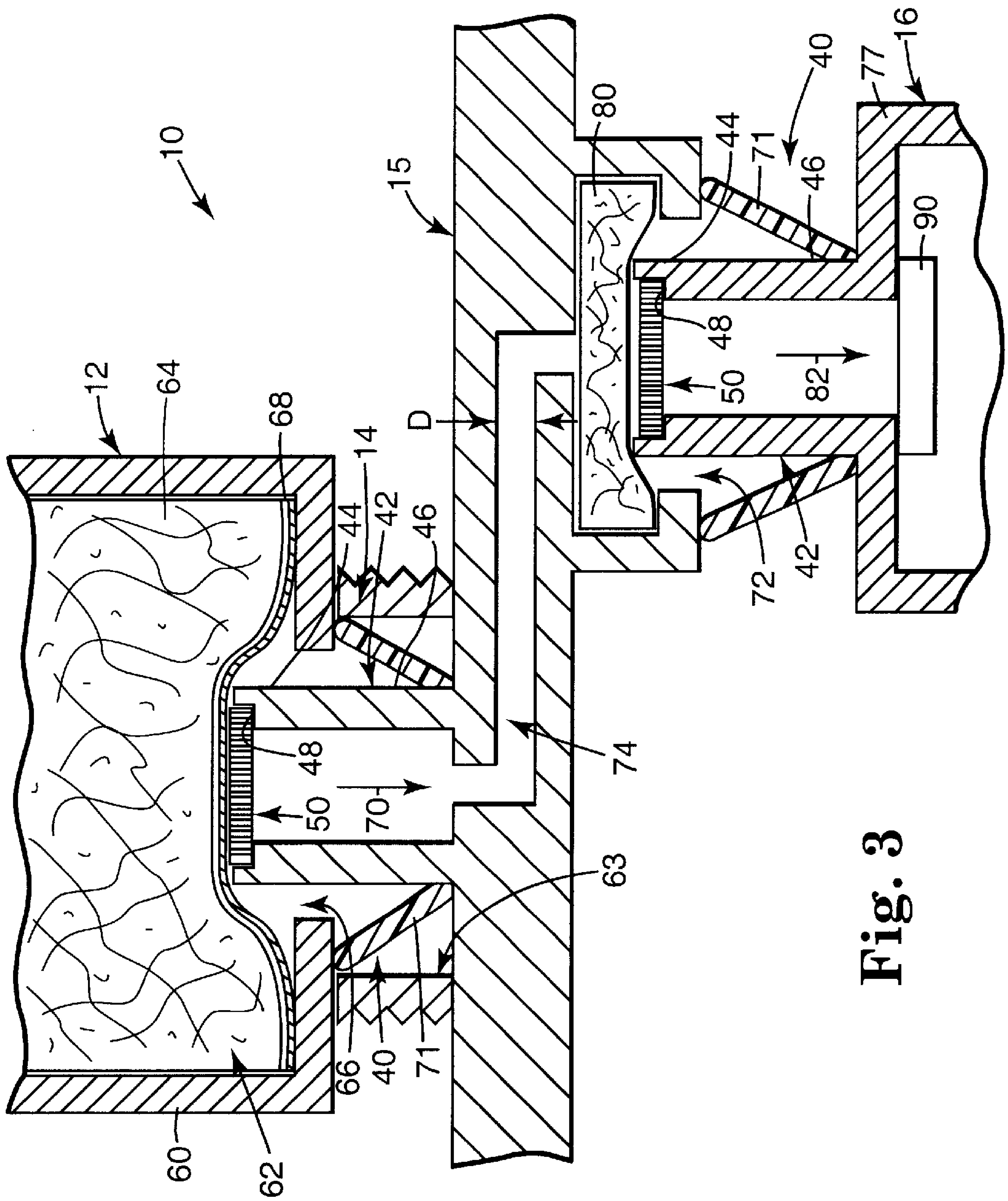

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Fig. 3

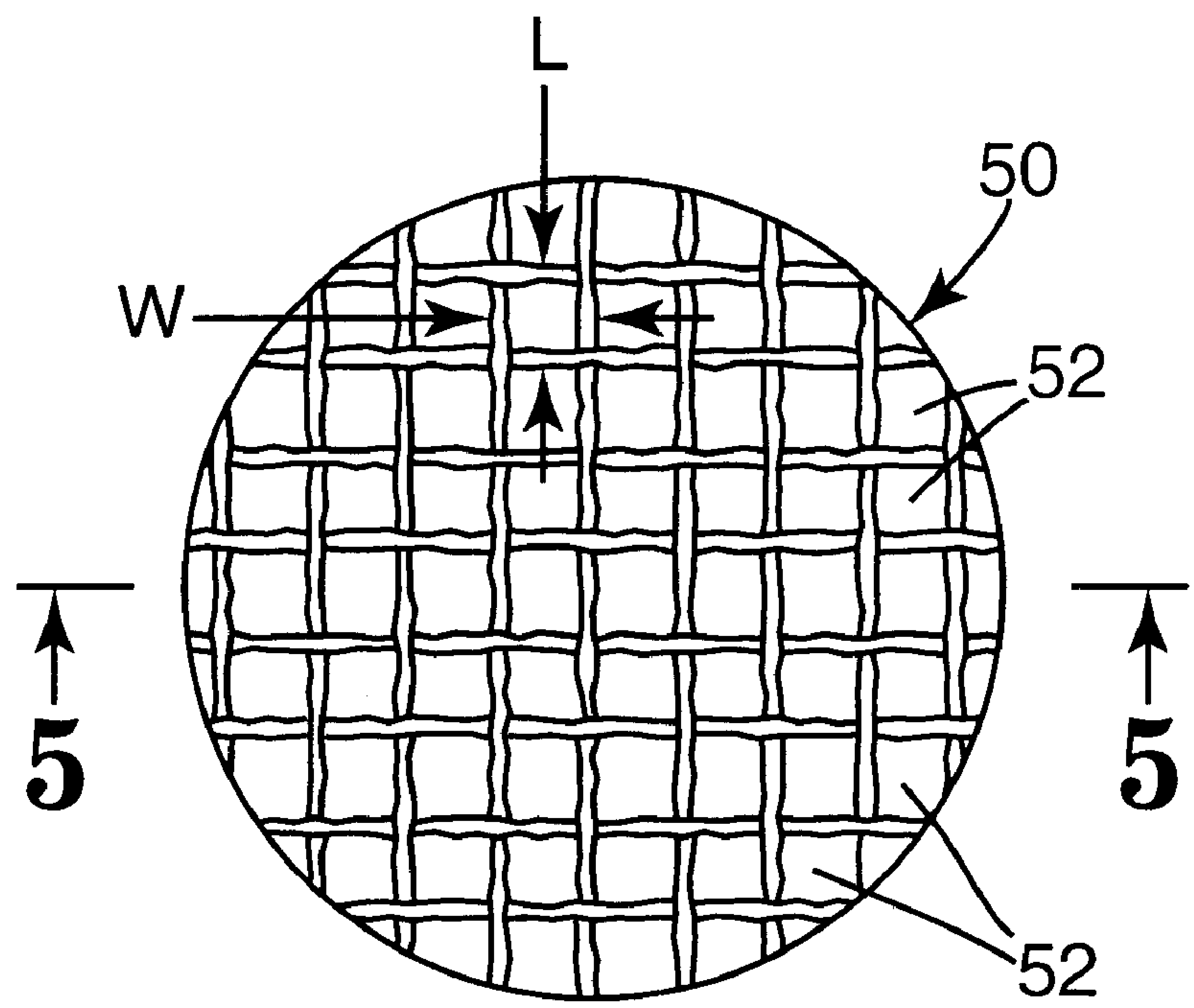

Fig. 4

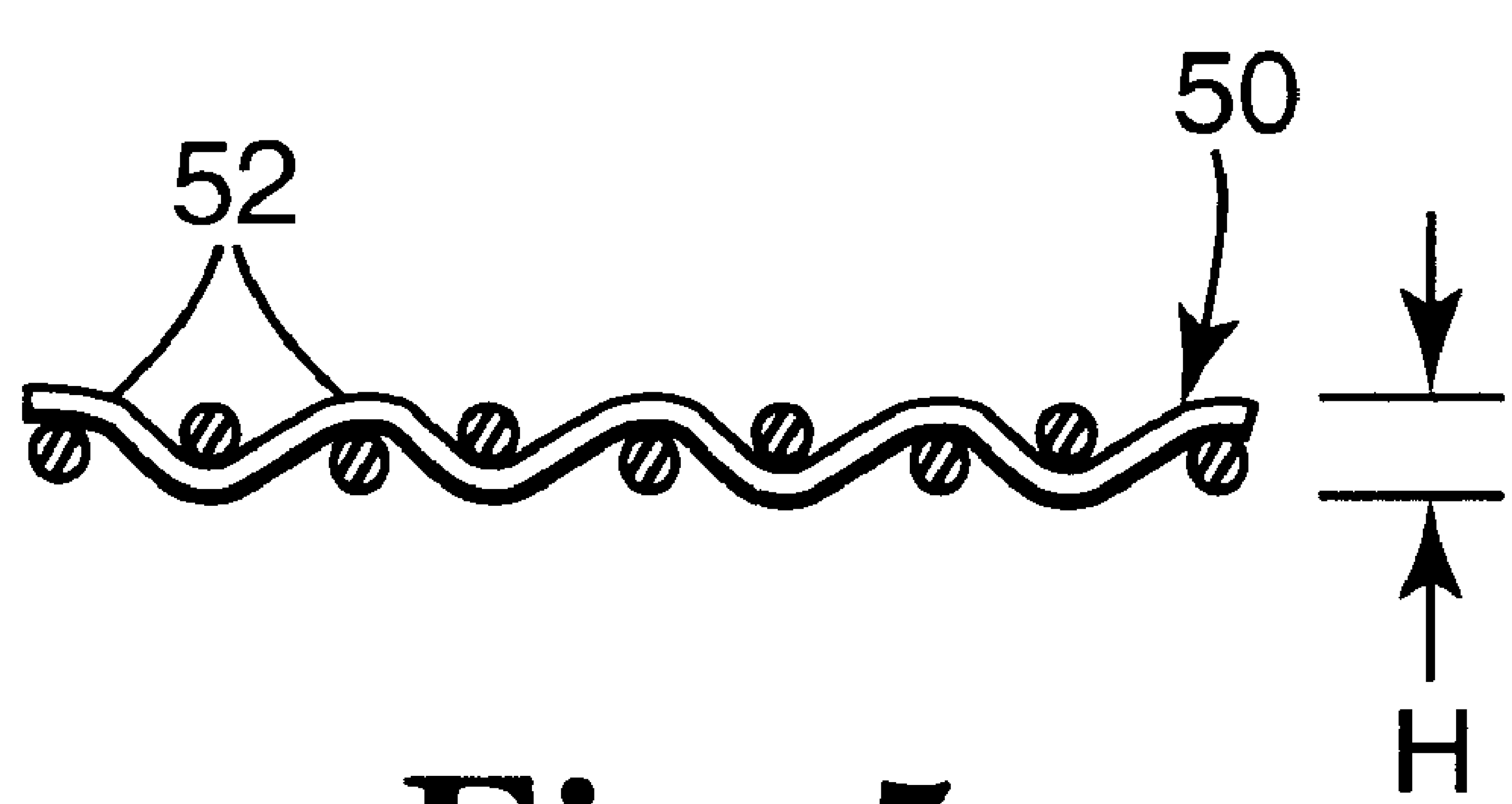

Fig. 5

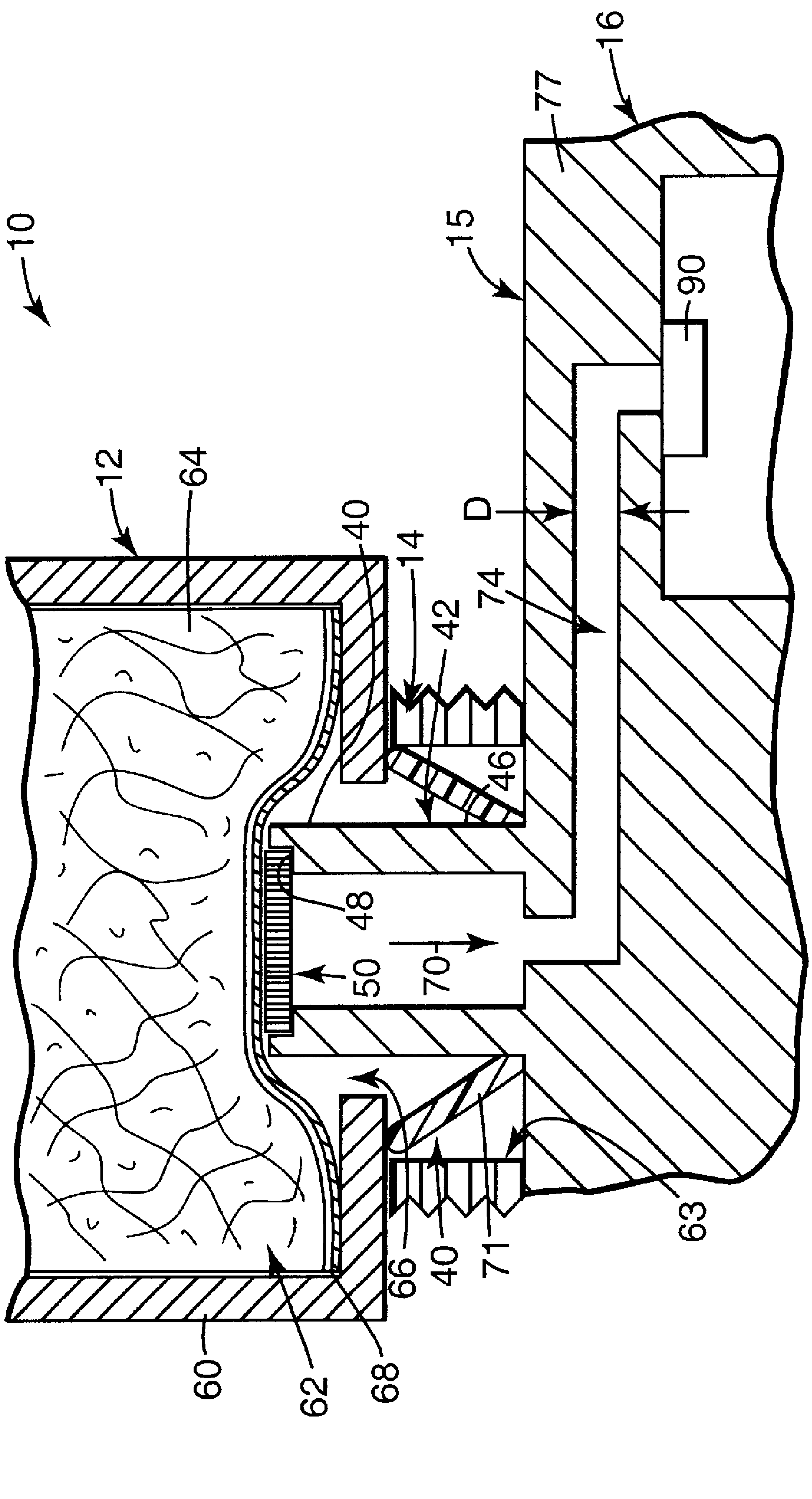

Fig. 6

INKJET PRINTING SYSTEMS USING FILTER FLUID INTERCONNECTS FOR PIGMENTED INKS

TECHNICAL FIELD

This invention relates to inkjet printing systems. In particular, the present invention is a pigmented ink delivery system that employs filter fluid interconnects to fluidly interconnect separable ink delivery system components. The filter fluid interconnects function to provide reliable fluid interconnects between ink delivery system components, such as ink supply containers, inkjet printheads and ink manifold structures of an ink container receiving station. The screen filter fluid interconnects also prevent drooling of ink when ink delivery system components are separated, prevent clogging of the pigmented ink delivery system, and impede the passage of debris and air bubbles from the ink supply containers to the printheads.

BACKGROUND OF THE INVENTION

Throughout the business world, inkjet printing systems are extensively used for image reproduction. Inkjet printers frequently make use of an inkjet printhead mounted within a carriage that is moved back and forth across print media, such as paper. As the printhead is moved relative to the print media, a control system activates the printhead to deposit or eject ink droplets onto the print media to form images and text. Such systems may be used in a wide variety of applications, including computer printers, plotters, copiers and facsimile machines.

Ink is provided to the printhead by a supply of ink that is either integral with the printhead, as in the case of a disposable print cartridge, or by a supply of ink that is replaceable separate from the printhead. One type of previously used printing system makes use of an ink supply that is carried with the carriage. This ink supply has been formed integral with the printhead, whereupon the entire printhead and ink supply are replaced when ink is exhausted. Alternatively, the ink supply can be carried with the carriage and be separately replaceable from the printhead. As a further alternative, the ink supply can be mounted to the printing system such that the ink supply does not move with the carriage. For the case where the ink supply is not carried with the carriage, the ink supply can be in fluid communication with the printhead to replenish the printhead or the printhead can be intermittently connected with the ink supply by positioning the printhead proximate to a filling station to which the ink supply is connected whereupon the printhead is replenished with ink from the refilling station. Generally, when the ink supply is separately replaceable, the ink supply is replaced when exhausted. The printhead is then replaced at the end of printhead life. Regardless of where the ink supply is located within the printing system, it is critical that the ink supply provides a reliable supply of ink to the inkjet printhead.

Inkjet printing systems typically employ either dye based inks or pigmented inks. In dye based inks, the ink color is in solution and defines the ink itself. As such, dye based inks readily remain in solution. In pigmented inks, the ink color is defined by particles suspended in a carrier fluid. As such, in pigmented inks, the ink color particles can fall out of suspension (i.e., flocculate) or the carrier fluid can evaporate off leaving the ink color particles behind. These conditions are not as pronounced in dye based inks, since dye based inks easily remain in solution, and if the ink color of dye

based inks does settle out, the ink color readily goes back in suspension. In ink delivery systems that use dye based inks, a fluid interconnect, employing a fluid delivery tower having a filter, is used to fluidically couple separable ink delivery components, such as ink containers, printheads and a carriage manifold.

The filter of the filter/tower fluid interconnect allows passage of the dye based ink when the ink delivery system is operating, and prevents ink drooling when the ink delivery components are disconnected. In addition, the filter of the filter/tower fluid interconnect can impede the passage of air bubbles and particulate matter to the ink delivery tower and ultimately to the print element of the printhead. If bubbles and particulate matter enters the print element, they can block the ink delivery channels, conduits, chambers, orifices and ink ejection nozzles of the print element, thereby adversely affecting printhead performance. This clogging is likely to result in one or more inoperable firing chambers within the printhead, which would require that the clogged printhead, be replaced with a new printhead before the useful life of the clogged printhead is exhausted. From the perspective of cost, this course of action is undesirable. In addition to providing filtering benefits, the filter/tower fluid interconnects used with dye based inks are economical to manufacture.

In pigmented ink delivery systems, flocculation and evaporation of carrier fluid becomes a particular problem when a user disconnects the separable ink supply containers and/or printheads from the carriage manifold. At this time, fluid interconnects between the ink containers, printheads and carriage manifold are exposed to the atmosphere, and the carrier fluid at the fluid interconnects can quickly evaporate off leaving behind ink color particles that may clog these fluid interconnects. In addition to evaporative based clogging, if the containers, printheads and carriage remain in a sedentary state for too long, the ink color particles can settle out of the carrier fluid also resulting in clogging of the fluid interconnects. As such, ink delivery systems that use pigmented inks, do not use filter/tower fluid interconnects since the filter can become easily clogged upon evaporation of the carrier fluid or when the ink color particles settle out of the carrier fluid. Moreover, ink delivery channels associated with the fluid interconnect can become clogged with pigmented ink viscous plugs due to liquid bridging. Therefore ink delivery systems for pigmented inks typically employ higher cost (when compared to filter/tower fluid interconnects) needle/septum fluid interconnects that can easily dislodge or break up pigmented ink clogs as the needle pierces the septum.

There is a need for improved fluid interconnects for components of ink delivery systems. In particular, there is a need for a filter/tower fluid interconnect that is not susceptible to pigmented ink clogs caused by the ink color particles falling out of suspension (i.e., flocculation) or the carrier fluid evaporating off leaving the ink color particles behind. Moreover, ink delivery channels associated with the filter/tower fluid interconnect should not be susceptible to clogging caused by pigmented ink viscous plugs as a result of liquid bridging. In addition, the filter/tower fluid interconnect should prevent pigmented ink drooling (i.e., leakage) at ink outlets and inlets when separable ink supply containers and printheads are disconnected from a carriage manifold. Further, the filter/tower fluid interconnect should impede debris and air bubbles from clogging or otherwise restricting the flow of pigmented ink from an ink reservoir of an ink container to a print element of a printhead. The filter/tower fluid interconnect should reliably provide these features throughout the useful life of the pigmented ink delivery system components so as to preclude premature replacement of these components and the associated cost. Lastly, the filter/tower fluid interconnect should be relatively easy and inexpensive to manufacture, and relatively simple to incorporate into components used in pigmented ink delivery systems of thermal inkjet printing systems.

SUMMARY OF THE INVENTION

The present invention is a pigmented fluid delivery system. The pigmented fluid delivery system comprises a first component and a second component. The first component has a fluid outlet in fluid communication with a supply of pigmented fluid. The second component has a fluid inlet releasably connectable to the fluid outlet of the first component. The fluid inlet includes a filter compatible with the supply of pigmented fluid.

In one aspect of the present invention, the pigmented fluid is defined by particles suspended in a carrier fluid, and the filter is an open weave screen defining a plurality of pores. The pores are sized to allow passage of the pigmented fluid while preventing clogging from flocculation of the particles and evaporation of the carrier fluid. In addition, the pores are sized to retain pigmented ink (i.e., prevent drooling) when the first and second components are disconnected. In a further aspect of the present invention, each pore of the plurality of pores has an edge-to-edge dimension of 200 μm, and a depth dimension of 170 μm which is perpendicular to the edge-to-edge dimension. In another aspect of the present invention, each pore of the plurality of pores has an edge-to-edge dimension of 106 μm, and a depth dimension of 70 μm which is perpendicular to the edge-to-edge dimension. In still another aspect of the present invention, the fluid inlet of the second component includes a cylindrical tower having an upstream end to which the filter is mounted and an opposite downstream end. A cylindrical channel extends perpendicular to the tower, and is in fluid communication with the downstream end of the tower. The channel has a diameter of 2.0 mm. In still a further aspect of the present invention, the first component is a replaceable fluid container, and the second component is a replaceable printhead. In yet another aspect of the present invention, the ink delivery system includes a third component having a fluid inlet releasably connectable to a fluid outlet of the second component. The fluid inlet of the third component includes a filter compatible with the supply of pigmented fluid. In this aspect of the present invention, the first component is a replaceable fluid container including a reservoir containing the supply of pigmented fluid, the second component is a manifold adapted to removably receive the replaceable fluid container, and the third component is a replaceable printhead adapted to be removably received by the manifold.

In another embodiment, the present invention provides a fluid interconnect. The fluid interconnect includes a tower member adapted to be connectable to a supply of pigmented fluid defined by particles suspended in a carrier liquid. A screen is mounted to the tower member. The screen defines a plurality of pores sized to allow passage of pigmented fluid from the supply of pigmented fluid, and sized so as to prevent clogging due to flocculation of the particles and evaporation of the carrier fluid.

In a further embodiment, the present invention provides a printer component. The printer component comprises a housing that includes a fluid inlet. The fluid inlet is releasably connectable to a supply of pigmented fluid. The fluid inlet includes a filter defining a plurality of pores sized to allow passage of pigmented fluid from the supply of pigmented fluid, and sized so as to prevent clogging due to flocculation of the particles and evaporation of the carrier fluid.

The filter/tower fluid interconnect of the present invention is not susceptible to pigmented ink clogs caused by the ink color particles falling out of suspension (i.e., flocculation) or the carrier fluid evaporating off leaving the ink color particles behind. Moreover, the ink delivery channel associated with the screen filter/tower fluid interconnect is not susceptible to clogging caused by pigmented ink viscous plugs as a result of liquid bridging. In addition, the filter/tower fluid interconnect of the present invention substantially prevents pigmented ink drooling (i.e., leakage) when the separable ink delivery components are disconnected. Moreover, the filter/tower fluid interconnect of the present invention impedes debris and air bubbles from clogging or otherwise restricting the flow of pigmented ink from an ink reservoir of an ink container to a print element of a printhead. The filter/tower fluid interconnect of the present invention reliably provides these features throughout the useful life of the pigmented ink delivery system components so as to preclude premature replacement of these components and the associated cost. Lastly, the filter/tower fluid interconnect of the present invention is relatively easy and inexpensive to manufacture, and relatively simple to incorporate into components used in pigmented ink delivery systems of thermal inkjet printing systems.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide a further understanding of the present invention and are incorporated in and constitute a part of this specification. The drawings illustrate the embodiments of the present invention and together with the description serve to explain the principles of the invention. Other embodiments of the present invention and many of the intended advantages of the present invention will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the figures thereof, and wherein:

FIG. **1** is a perspective view of a thermal inkjet printing system with a cover opened to show a plurality of replaceable ink containers, a receiving station, and a plurality of replaceable inkjet printhead cartridges incorporating filter fluid interconnects in accordance with the present invention.

FIG. **2** is a perspective view a portion of a scanning carriage showing the replaceable ink containers positioned in the receiving station which includes a manifold that provides fluid communication between the replaceable ink containers and one or more printhead cartridges.

FIG. **3** is a partial sectional view illustrating a replaceable ink container and a replaceable printhead cartridge in fluidically coupled with the manifold using the filter fluid interconnects in accordance with the present invention.

FIG. **4** is a greatly enlarged plan view of a screen filter of the filter fluid interconnect illustrated in FIG. **3**.

FIG. **5** is a sectional view of the screen filter taken along lines **5**—**5** in FIG. **4**.

FIG. **6** is a partial sectional view illustrating an alternative embodiment wherein a replaceable ink container is fluidically coupled directly to a replaceable printhead cartridge using a filter fluid interconnect in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Filter fluid interconnects **40** (see FIG. **3**) in accordance with the present invention are useable to fluidically couple a replaceable fluid container **12**, a manifold **15** on a receiving station **14**, and a printhead cartridge **16** of a thermal inkjet printing system **10** generally illustrated in FIGS. **1–3**.

In FIG. **1**, the printing system **10**, shown with its cover open, includes at least one replaceable fluid container **12** that is installed in a receiving station **14**. In one preferred embodiment, the printing system **10** includes two replaceable fluid containers **12**, with one single color fluid container **12** containing a black ink supply, and one multi-color fluid container **12** containing cyan, magenta and yellow pigmented ink supplies. With the replaceable fluid containers **12** properly installed into the receiving station **14**, pigmented fluid, such as pigmented ink, is provided from the replaceable fluid containers **12** to at least one inkjet printhead cartridge **16** by way of a manifold **15** (see FIGS. **2** and **3**) on the receiving station **14**. The pigmented ink is defined by ink color particles suspended in a carrier fluid. Generally, the printing system **10** includes at least two replaceable printhead cartridges **16**, such as one single color printhead cartridge **16** for printing from the black pigmented ink supply, and one multicolor printhead cartridge **16** for printing from the cyan, magenta and yellow pigmented ink supplies. In one preferred embodiment, the printing system **10** includes four replaceable printhead cartridges **16**, such that one printhead cartridge **16** is used for printing from each of the black, cyan, magenta and yellow pigmented ink supplies.

In operation, the inkjet printhead cartridges **16** are responsive to activation signals from a printer portion **18** to deposit pigmented fluid on print media **22**. As pigmented fluid is ejected from the printhead cartridges **16**, the printhead cartridges **16** are replenished with pigmented fluid from the fluid containers **12**. In one preferred embodiment, the replaceable fluid containers **12**, receiving station **14**, manifold **15**, and the replaceable inkjet printhead cartridges **16** are each part of a scanning carriage **20** that is moved relative to the print media **22** to accomplish printing. The printer portion **18** includes a media tray **24** for receiving the print media **22**. As the print media **22** is stepped through a print zone, the scanning carriage **20** moves the printhead cartridges **16** relative to the print media **22**. The printer portion **18** selectively activates the printhead cartridges **16** to deposit pigmented fluid on print media **22** to thereby accomplish printing.

The scanning carriage **20** of FIG. **1** slides along a slide rod **26** to print along a width of the print media **22**. A positioning means (not shown) is used for precisely positioning the scanning carriage **20**. In addition, a paper advance mechanism (not shown) moves the print media **22** through a print zone as the scanning carriage **20** is moved along the slide rod **26**. Electrical signals are provided to the scanning carriage **20** for selectively activating the printhead cartridges **16** by means of an electrical link, such as a ribbon cable **28**.

FIG. **2** is a perspective view of a portion of the scanning carriage **20** showing the pair of replaceable fluid containers **12** properly installed in the receiving station **14**. For clarity, only a single inkjet printhead cartridge **16** is shown in fluid communication with the manifold **15** of the receiving station **14**. As seen in FIG. **2**, each of the replaceable fluid containers **12** includes a latch **30** for securing the replaceable fluid container **12** to the receiving station **14**. In addition, the receiving station **14** includes a set of keys **32** that interact with corresponding keying features (not shown) on the replaceable fluid containers **12**. The keying features on the replaceable fluid containers **12** interact with the keys **32** on the receiving station **14** to ensure that the replaceable fluid containers **12** are compatible with the receiving station **14**.

FIG. **3** illustrates the manifold **15** of the receiving station **14** which includes a fluid inlet or filter fluid interconnect **40** in accordance with the present invention, and further illustrates the replaceable printhead cartridge **16** which also includes a fluid inlet or filter fluid interconnect **40** in accordance with the present invention. The filter fluid interconnects **40** of the manifold **15** and the printhead cartridge **16** are substantially similar, so only the filter fluid interconnect **40** associated with the manifold **15** will be described with particularity. In addition, it is to be understood that the manifold **15** includes four of the filter fluid interconnects **40**, one for printing each of the black, cyan, magenta and yellow pigmented ink supplies of the black and tri-color replaceable fluid containers **12**. Moreover, in one preferred embodiment, each of the black, cyan, magenta and yellow printhead cartridges **16** includes a single filter fluid interconnect **40** for printing from the black, cyan, magenta and yellow pigmented ink supplies. FIG. **3** illustrates a sectional view through the black fluid container **12** and black printhead cartridge **16** only.

As seen in FIG. **3**, the screen filter fluid interconnect **40** includes a cylindrical fluid delivery tower **42** having an upstream end **44** and an opposite downstream end **46**. In one preferred embodiment, the tower **42** has an inside diameter of 3.5 mm. The upstream end **44** includes a peripheral ledge **48** for supporting a filter **50** (see FIG. **4**) which is heat staked thereto. In one preferred embodiment, the filter **50** is an open weave screen made by weaving strands of stainless steel. As seen in FIGS. **4** and **5**, the filter **50** defines a plurality of square shaped pores **52**. Although square shaped pores **52** are illustrated, it is to be understood that other shapes of pores, such as circular or rectangular are also useable. Each pore **52** has a length dimension "L" and a width dimension "W". Since each pore **52** is square shaped, the length dimension "L" is equal to the width dimension "W", as such, the length dimension "L" and the width dimension "W" will simply be referred to as the edge-to-edge dimension of the pore **52** through the remainder of this description. The edge-to-edge dimension (i.e., either the length dimension "L" or the width dimension "W") of each pore **52** is at least 50 μm and less than 500 μm. More specifically, the edge-to-edge dimension of each pore **52** is at least 100 μm.

In one preferred embodiment, the edge-to-edge dimension of each pore **52** of the filter **50** of the filter fluid interconnect **40** associated with the manifold **15** is 106 μm, while the edge-to-edge dimension of each pore **52** of the filter **50** of the filter fluid interconnect **40** associated with the printhead **16** is 200 μm. The pores **52** of the filter **50** associated with the printhead **16** are larger than the pores **52** of the filter **50** associated with the manifold **15** simply to allow sufficient passage of air into the printhead **16** so as to prevent vapor lock.

As seen in FIG. **5**, each pore **52** has a depth dimension "H" perpendicular to the edge-to-edge dimension. The depth dimension "H" of each pore **52** is at least 50 μm and less than 500 μm. In one preferred embodiment, the depth dimension "H" of each pore **52** of the filter **50** associated with the manifold **15** is 70 μm, while the depth dimension "H" of each pore **52** of the filter **50** associated with the printhead **16** is 170 μm. As such, each pore **52** of the filter **50** associated with the manifold **15** has a depth dimension to edge-to-edge dimension ratio of substantially 0.65, while each pore **52** of the filter **50** associated with the printhead **16** has a depth dimension to edge-to-edge dimension ratio of substantially 0.85.

Overall, the pores **52** of the filters **50** of both the manifold **15** and the printhead **16** are sized small enough to retain ink and prevent drooling when the fluid container **12** and printhead **16** are disconnected from the manifold **15**. In addition, the pores **52** of the filters **50** of both the manifold **15** and the printhead **16** are sized large enough to prevent clogging of the pores **52** due to flocculation of the ink color particles (i.e., the ink color particles falling out of suspension) which may occur when the ink container **12** and printhead **16** are disconnected from the receiving station **14** and thereby manifold **15**, and/or evaporation of the carrier fluid which leaves the ink color particles behind which may occur when the ink container **12**, the printhead **16** and the manifold **15** remain in a sedentary state for too long.

As seen in FIG. **3**, the replaceable ink container **12** includes a housing **60** defining a reservoir portion **62** for containing the supply of pigmented fluid. In particular, the reservoir portion **62** has a capillary storage member **64** disposed therein. The capillary storage member **64** is a porous member having sufficient capillarity to retain pigmented ink to prevent ink leakage from the reservoir **62** during insertion and removal of the ink container **12** from the receiving station **14** of the printing system **10**. This capillary force must be sufficiently great to prevent pigmented ink leakage from the ink reservoir **62** over a wide variety of environmental conditions such as temperature and pressure changes. In addition, the capillarity of the capillary member **64** is sufficient to retain pigmented ink within the ink reservoir **62** for all orientations of the ink reservoir **62** as well as a reasonable amount of shock and vibration the ink container **12** may experience during normal handling. The preferred capillary storage member **64** is a network of heat bonded polymer fibers.

As seen in FIG. **3**, the housing **60** of the replaceable ink container **12** includes a fluid outlet **66** defined by a through opening in the housing **60**. A screen **68** is disposed between the capillary member **64** and the fluid outlet **66**. Upon insertion of the replaceable ink container **12** into the receiving station **14**, the upstream end **44** of the tower **42** of the fluid interconnect **40** of the manifold **15**, which extends through an opening **63** in the receiving station **14**, passes into the fluid outlet **66**, bears against the screen **68** and compresses the capillary member **64**, creating an area of increased capillarity in the vicinity of the upstream end **44** of the tower **42**. This area of increased capillarity draws pigmented ink to the filter **50** so that the pigmented ink may pass through the pores **52** and into the tower **42** as represented by directional arrow **70**. The filter **50** of the manifold **15** is compatible with pigmented ink. In particular, the pores **52** of the filter **50** of the manifold **15** are sized small enough to retain ink and prevent drooling when the fluid container **12** is disconnected from the manifold **15**, and to impede bubbles and debris (particulate matter) from passing through the filter **50** and into the tower **42**; and are sized large enough to prevent clogging of the pores **52** due to flocculation of the ink color particles (i.e., the ink color particles falling out of suspension) which may occur when the ink container **12** is disconnected from the receiving station **14** and thereby manifold **15**, and/or evaporation of the carrier fluid, which leaves the ink color particles behind, and may occur when the ink container **12** and the manifold **15** remain in a sedentary state for too long. An elastomer fluid seal **71** surrounding the tower **42** prevents fluid leakage and impedes evaporation of the carrier fluid at the engagement interface of the fluid outlet **66** and the fluid interconnect **40**.

As seen in FIG. **3**, the manifold **15** includes a fluid outlet **72** defined by a through opening. The fluid outlet **72** is in fluid communication with the downstream end **46** of the tower **42** of the fluid interconnect **40** by way of a cylindrical channel **74** that extends substantially perpendicular to the tower **42**. The channel **74** has an inside diameter dimension "D" greater than 1.2 mm. In one preferred embodiment, the inside diameter dimension "D" of the channel **74** is 2.0 mm. The channel **74** is sized large enough so as not to be susceptible to clogging by viscous plugs as a result of surface tension forces which cause the pigmented ink to form a liquid bridge across the inside diameter of the channel **74**. The fluid outlet **72** of the manifold **15** releasably receives the fluid interconnect **40** of the printhead cartridge **16**.

The fluid interconnect **40** on a housing **77** of the printhead cartridge **16** functions with the fluid outlet **72** of the manifold **15** in a similar manner as the fluid interconnect **40** of the manifold **15** functions with the fluid outlet **66** of the ink container **12**. In particular, the filter **50** of the printhead **16** is compatible with pigmented ink, and the pores **52** of the filter **50** of the printhead **16** are sized small enough to retain ink and prevent drooling when the fluid container **12** is disconnected from the manifold **15**, and to impede some bubbles and debris (particulate matter) from passing through the filter **50** and into the tower **42**. In addition, the pores **52** of the filter **50** of the printhead **16** are sized large enough to prevent clogging of the pores **52** due to flocculation of the ink color particles (i.e., the ink color particles falling out of suspension) which may occur when the printhead **16** is disconnected from the receiving station **14** and thereby manifold **15**, and/or evaporation of the carrier fluid, which leaves the ink color particles behind, and may occur when the printhead **16** and the manifold **15** remain in a sedentary state for too long.

The fluid outlet **72** of the manifold **15** includes a manifold capillary member **80**. Upon engagement of the printhead cartridge **16** with the manifold **15**, the tower **42** of the fluid interconnect **40** of the printhead cartridge **16** compresses the capillary member **80** creating an area of increased capillarity in the vicinity of the upstream end **44** of the tower **42**. This area of increased capillarity draws pigmented ink to the filter **50** of the printhead **16** so that the pigmented ink may pass through the pores **52** and into the tower **42** and to a pressure regulator **90** of the printhead cartridge **16** as represented by directional arrow **82**.

FIG. **6** illustrates an alternative embodiment wherein the manifold **15** has been eliminated and the ink container **12** is directly releasably connected to the printhead cartridge **16**. In this alternative embodiment, like parts are labeled with like numerals. In this alternative embodiment, the fluid interconnect **40** of the printhead cartridge **16** functions with the fluid outlet **66** of the ink container **12**.

The filter/tower fluid interconnect **40** of the present invention retains ink and substantially prevents ink drooling when the ink container **12** and the printhead **16** are disconnected from the manifold **15**. In addition, the filter/tower fluid interconnect **40** of the present invention is not susceptible to pigmented ink clogs caused by the ink color particles falling out of suspension (i.e., flocculation) or the carrier fluid evaporating off leaving the ink color particles behind. Moreover, the ink delivery channel **74** associated with the filter/tower fluid interconnect **40** is not susceptible to clogging caused by pigmented ink viscous plugs as a result of liquid bridging. Further, the filter/tower fluid interconnect **40** of the present invention impedes debris and air bubbles from clogging or otherwise restricting the flow of pigmented ink from an ink reservoir **62** of an ink container **12** to a print element of a printhead **16**. The filter/tower fluid interconnect **40** of the present invention reliably provides these features throughout the useful life of the pigmented ink delivery system components so as to preclude premature replacement of these components and the associated cost. Lastly, the filter/tower fluid interconnect **40** of the present invention is relatively easy and inexpensive to manufacture, and relatively simple to incorporate into components used in pigmented ink delivery systems of thermal inkjet printing systems.

Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

What is claimed is:

1. A pigmented fluid delivery system comprising:

a first component having a fluid outlet in fluid communication with a supply of pigmented fluid defined by particles suspended in a carrier liquid; and

a second component having a fluid inlet releasably connectable to the fluid outlet of the first component, the fluid inlet including a filter allowing passage of the supply of pigmented fluid while preventing clogging due to flocculation of the particles and evaporation of the carrier fluid, wherein the filter includes a plurality of pores, and wherein each pore of the plurality of pores has an edge-to-edge dimension of at least 150 μm and less than 500 μm.

2. The pigmented fluid delivery system of claim **1** wherein the edge-to-edge dimension of each pore of the plurality of pores is 200 μm.

3. The pigmented fluid delivery system of claim **1** wherein the filter includes a plurality of pores, wherein each pore of the plurality of pores has a depth dimension, and wherein the depth dimension of each pore of the plurality of pores is at least 50 μm and less than 500 μm.

4. The pigmented fluid delivery system of claim **3** wherein the depth dimension of each pore of the plurality of pores is 70 μm.

5. The pigmented fluid delivery system of claim **3** wherein the depth dimension of each pore of the plurality of pores is 170 μm.

6. The pigmented fluid delivery system of claim **3** wherein the depth dimension of each pore of the plurality of pores is 70 μm, and wherein the edge-to-edge dimension of each pore of the plurality of pores is 106 μm.

7. The pigmented fluid delivery system of claim **3** wherein the depth dimension of each pore of the plurality of pores is 170 μ, and wherein the edge-to-edge dimension of each pore of the plurality of pores is 200 μm.

8. The pigmented fluid delivery system of claim **3** wherein each pore of the plurality of pores is square in shape, wherein the edge-to-edge dimension is one of a length dimension and a width dimension, and wherein the length dimension and width dimension are substantially equal.

9. The pigmented fluid delivery system of claim **1** wherein each pore of the plurality of pores has an edge-to-edge dimension, and wherein each pore of the plurality of pores has a depth dimension to edge-to-edge dimension ratio of substantially 0.65.

10. The pigmented fluid delivery system of claim **1** wherein each pore of the plurality of pores has a depth dimension perpendicular to the edge-to-edge dimension, and wherein each pore of the plurality of pores has a depth dimension to edge-to-edge dimension ratio of substantially 0.85.

11. The pigmented fluid delivery system of claim **1** wherein the filter is an open weave screen, and wherein the open weave screen defines a plurality of square shaped pores.

12. The pigmented fluid delivery system of claim **11** wherein the open weave screen is made of stainless steel.

13. The pigmented fluid delivery system of claim **1** wherein the fluid inlet of the second component includes a cylindrical fluid delivery tower having an upstream end and an opposite downstream end, and wherein the filter is located at the upstream end.

14. The pigmented fluid delivery system of claim **13** wherein the fluid inlet is further defined by a cylindrical fluid delivery channel substantially perpendicular to the tower and in fluid communication with downstream end of the tower, the channel having a diameter dimension greater than 1.2 mm.

15. The pigmented fluid delivery system of claim **14** wherein the diameter dimension of the channel is 2.0 mm.

16. The pigmented fluid delivery system of claim **1** wherein the first component is a replaceable fluid container including a reservoir containing the supply of pigmented fluid, and wherein the second component is a replaceable printhead.

17. The pigmented fluid delivery system of claim **1** wherein the first component is a replaceable fluid container including a reservoir containing the supply of pigmented fluid, and wherein the second component is a manifold adapted to removably receive the replaceable fluid container.

18. The pigmented fluid delivery system of claim **1** wherein the second component is a replaceable printhead, and wherein the first component is a manifold adapted to removably receive the replaceable printhead.

19. A pigmented fluid delivery system comprising:

a first component having a fluid outlet in fluid communication with a supply of pigmented fluid;

a second component having a fluid inlet releasably connectable to the fluid outlet of the first component, the fluid inlet including a filter compatible with the supply of pigmented fluid, wherein the second component further includes a fluid outlet in fluid communication with the fluid inlet; and

a third component having a fluid inlet releasably connectable to the fluid outlet of the second component, the fluid inlet of the third component including a filter compatible with the supply of pigmented fluid;

wherein the filter of the second component and the filter of the third component each include a plurality of pores, and wherein each pore of the plurality of pores has an edge-to-edge dimension of at least 150 μm and less than 500 μm.

20. The pigmented fluid delivery system of claim **19** wherein the first component is a replaceable fluid container including a reservoir containing the supply of pigmented fluid, wherein the second component is a manifold adapted to removably receive the replaceable fluid container, and wherein the third component is a replaceable printhead adapted to be removably received by the manifold.

21. A fluid interconnect comprising:

a tower member adapted to be connectable to a supply of pigmented fluid defined by particles suspended in a carrier liquid; and

a screen mounted to the tower member, the screen defaming a plurality of pores sized to allow passage of pigmented fluid from the supply of pigmented fluid, and sized so as to prevent clogging due to flocculation of the particles and evaporation of the carrier liquid, wherein each pore of the plurality of pores has a edge-to-edge dimension, and wherein the edge-to-edge dimension is at least 150 μm and less than 500 μm.

22. The fluid interconnect of claim **21** wherein each pore of the plurality of pores has a depth dimension perpendicular to the edge-to-edge dimension, and wherein the depth dimension of each pore of the plurality of pores is at least 50 μm and less than 500 μm.

23. The fluid interconnect of claim **22** wherein the depth dimension of each pore of the plurality of pores is 170 μm, and wherein the edge-to-edge dimension of each pore of the plurality of pores is 200 μm.

24. The fluid interconnect of claim **22** wherein the depth dimension of each pore of the plurality of pores is 70 μm, and wherein the edge-to-edge dimension of each pore of the plurality of pores is 106 μm.

25. The fluid interconnect of claim **21** and further including:

a fluid delivery channel substantially perpendicular to the tower and in fluid communication with the tower, the channel having an edge-to-edge dimension greater than 1.2 mm.

26. The fluid interconnect of claim **25** wherein the edge-to-edge dimension of the channel is 2.0 mm.

27. A printer component comprising:

a housing including:

a fluid inlet releasably connectable to a supply of pigmented fluid defined by particles suspended in a carrier liquid, the fluid inlet including a filter defining a plurality of pores sized to allow passage of pigmented fluid from the supply of pigmented fluid, and sized so as to prevent clogging due to flocculation of the particles and evaporation of the carrier liquid, wherein each pore of the plurality of of pores has a edge-to-edge dimension, and wherein the edge-to-edge dimension is at least 150 μm and less than 500 μm.

28. The printer component of claim **27** wherein the printer component is a replaceable printer component.

29. The printer component of claim **28** wherein the replaceable printer component is a printhead.

30. The printer component of claim **27** wherein the printer component is a manifold adapted to removable receive a replaceable fluid container.

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